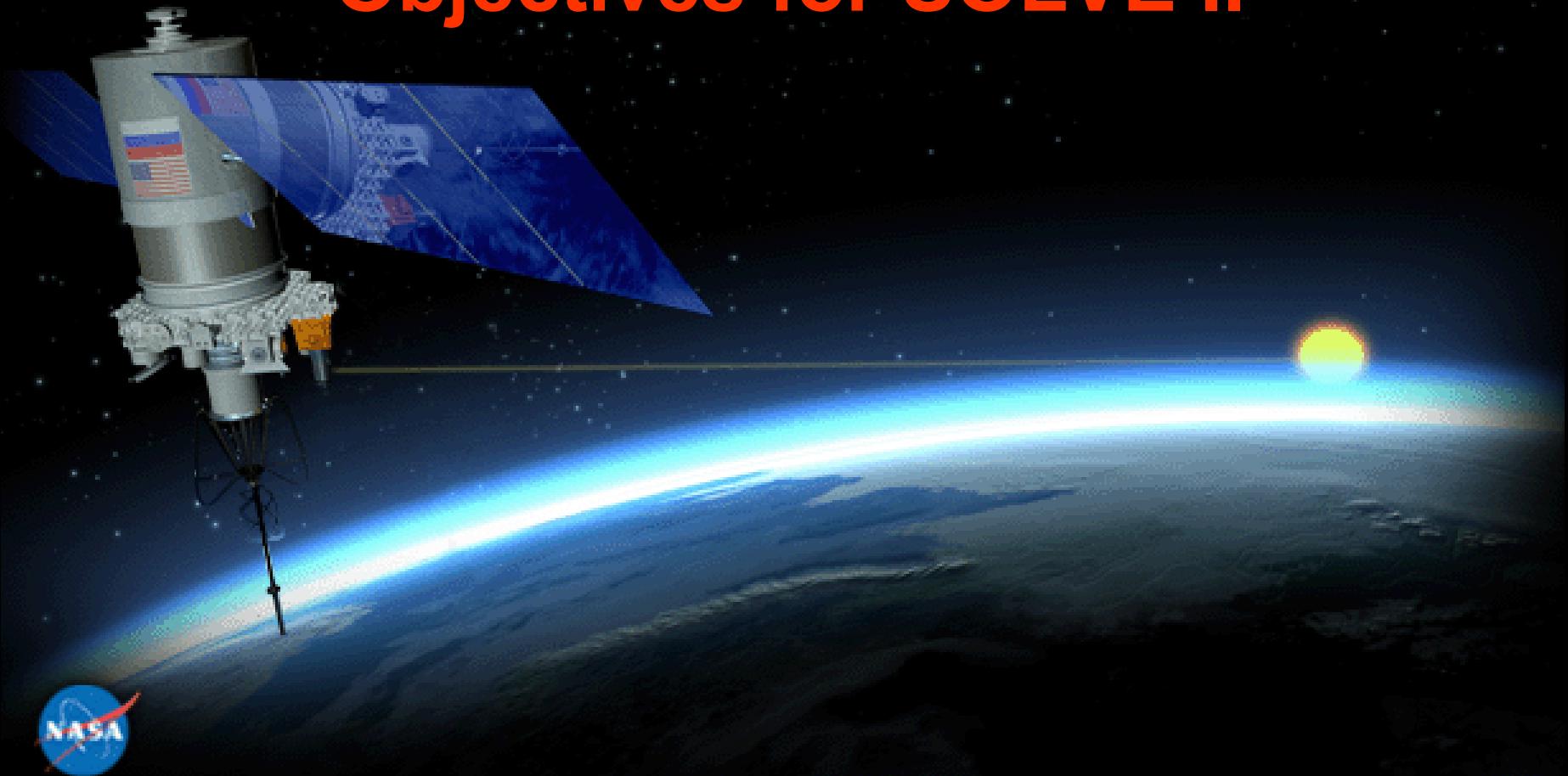


SAGE III Science and Validation Objectives for SOLVE II

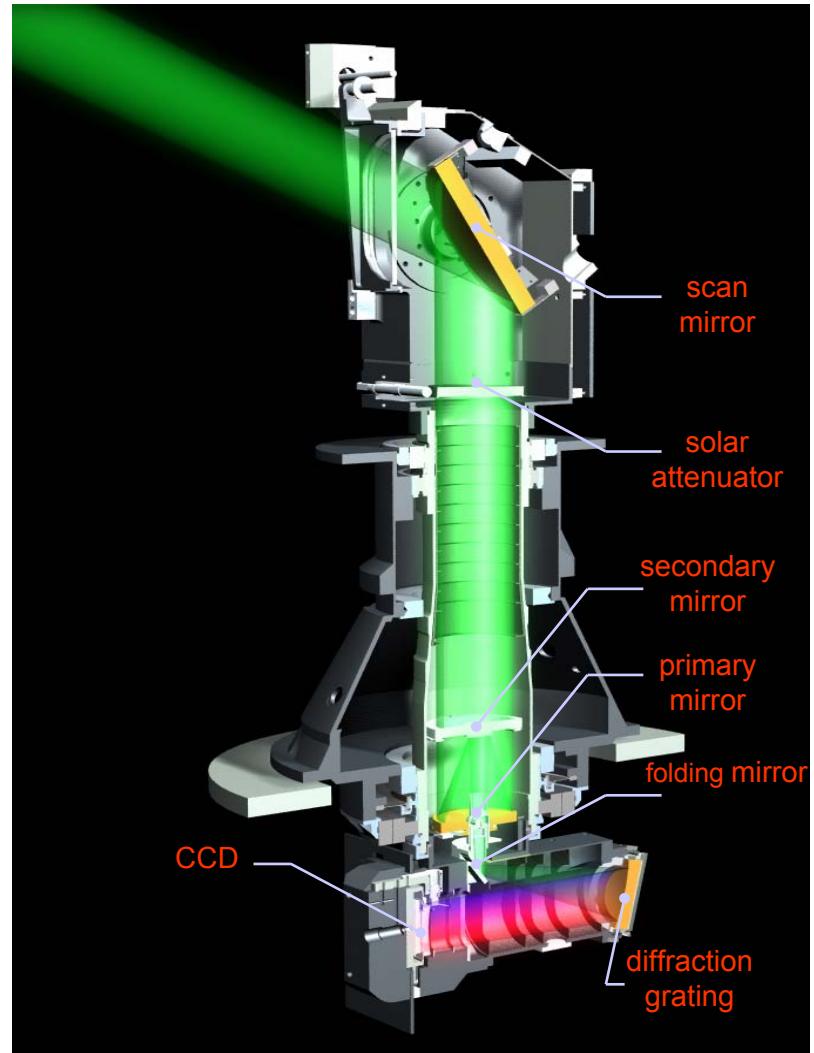


C. Trepte, L. Poole, M. Pitts, L. Thomason, J. Zawodny
B. Pierce and L. Harvey
(NASA Langley Research Center)



SAGE III Instrument

- Launched 10 December 2001 on Russian Meteor-3m spacecraft
- Based upon a UV/Visible spectrometer used to obtain profiles of O₃, aerosol, H₂O, NO₂, NO₃, OCIO, and temperature with a vertical resolution of ~1 km.
- New configuration includes:
 - CCD linear array for measurements between 290 and 1020 nm
 - Photodiode for aerosol measurements at 1550 nm
 - Fused-silicate attenuator plate enables lunar, solar, and limb-scattering observations
- Heritage:
 - Stratospheric Aerosol Measurement (SAM); Apollo-Soyuz (1975)*
 - SAM II; Nimbus 7 (1978-1993)*
 - SAGE I; AEM-B (1979-1981)*
 - SAGE II; ERBS (1984-present)*



SAGE III Instrument Schematic



Science Data Products



<i>Product</i>	<i>Estimated Precision</i>	<i>Altitude Range (km)</i>
Aerosol Extinction (@385, 448, 521, 676, 756, 869, 1020, 1540 nm)	5%	0-40
Aerosol Optical Depth (@ 521nm and longer)	5%	N/A
Ozone Number Density	5% (Solar) 10%(Lunar)	6-85 16-35(Lunar)
NO ₂ Number Density	15% (Solar) 15%(Lunar)	10-50 19-37
H ₂ O Number Density	15%	0-50
OC ₁ O Number Density	25% (Lunar)	15-25
NO ₃ Number Density	10% (Lunar)	10-55
Temperature and Pressure	2K 2%	0-85
Cloud Presence	N/A	6-30



Mission Status



- Launched Dec 10, 2001
- First solar data (Feb 28)
 - Sunset measurements ~ 100%
 - Sunrise measurements ~ 97%
 - Aerosol, O₃, and NO₂ data to be archived ~ Dec 15
- First lunar data on (Mar 5)
 - Approximately 80% Moonset data acquired
 - Limited Moonrise data acquired. Revising flight software to improve tracking
- Primary 1.7 GHz spacecraft transmitter failed (Jan 1)
- Spacecraft GPS/GLOSNAS failed
- Etalon problem with Solar Attenuator
- First limb-scattering data (Sep 8)



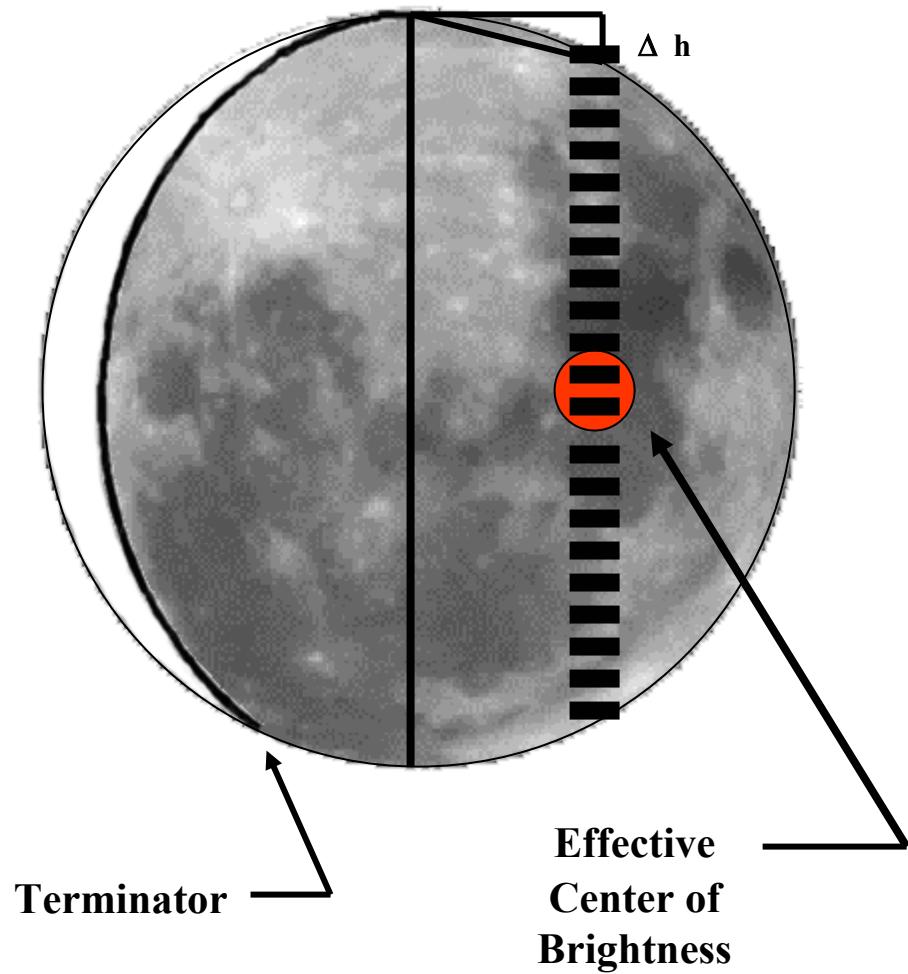
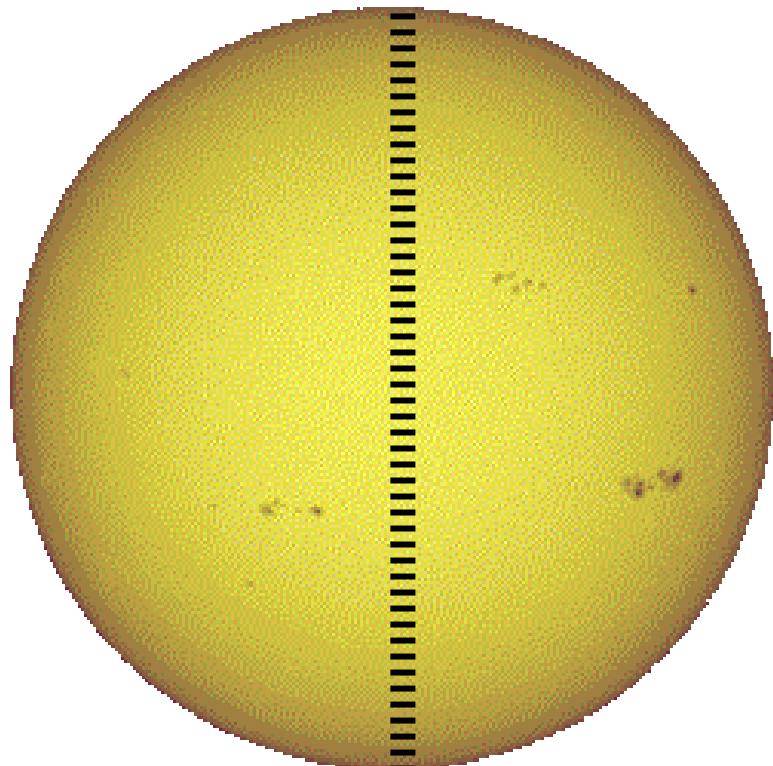
Validation/Science Objectives



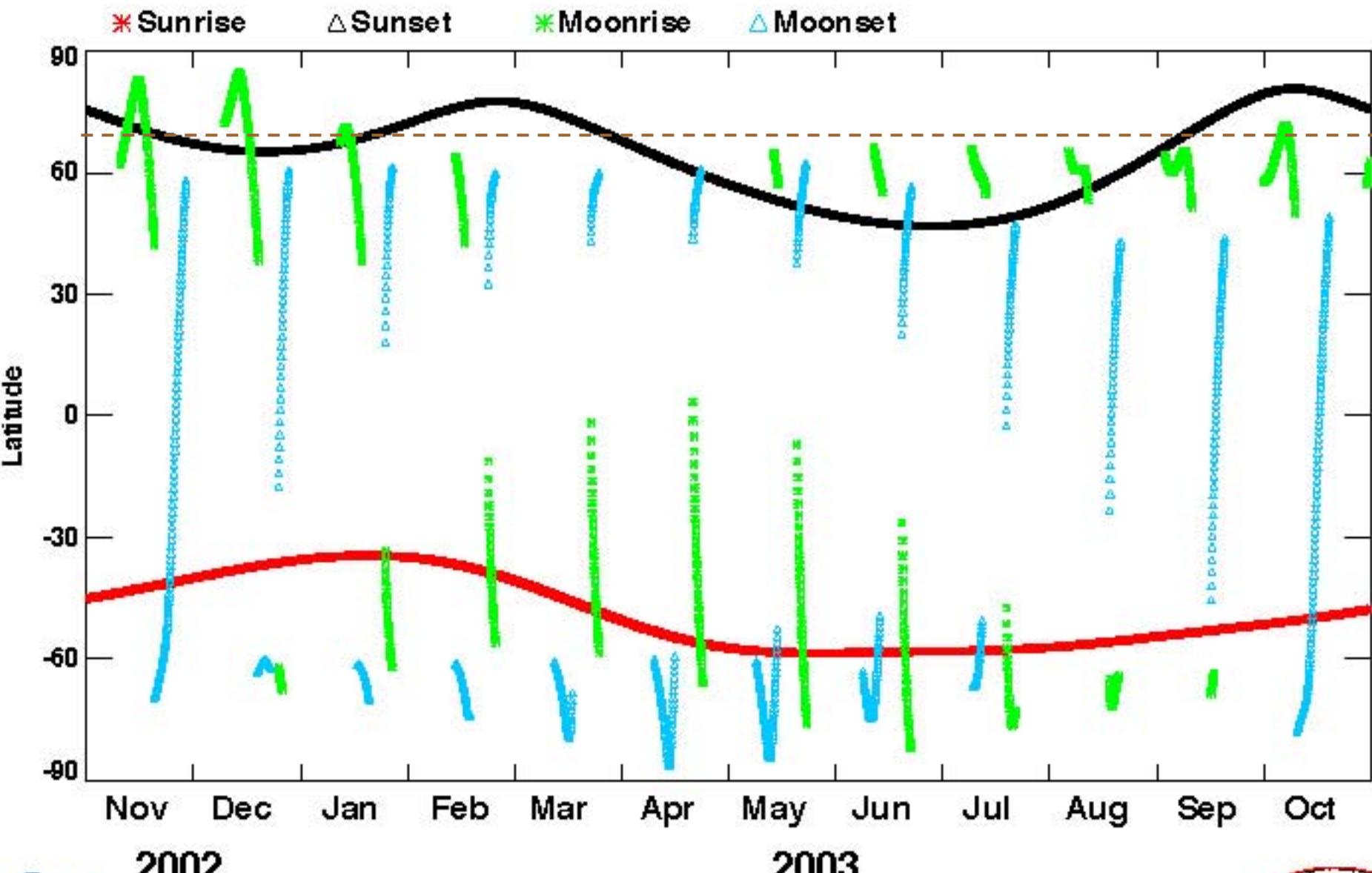
- Acquire correlative measurements
 - determine relative biases between sensors
 - investigate impact of inhomogeneities
- Verify altitude registration
 - impact of clouds
 - variation of lunar albedo & disk illumination
 - new technique based on $O_2 O_2$
- Examine impact of attenuator correction procedure
- Examine T dependence of O_3 cross-section in O_2 A-band
- Support winter O_3 loss studies (e.g, match campaign)
- PSC investigations



SAGE III Measurement Sequence



SAGE III Predicted Measurement Locations



2002

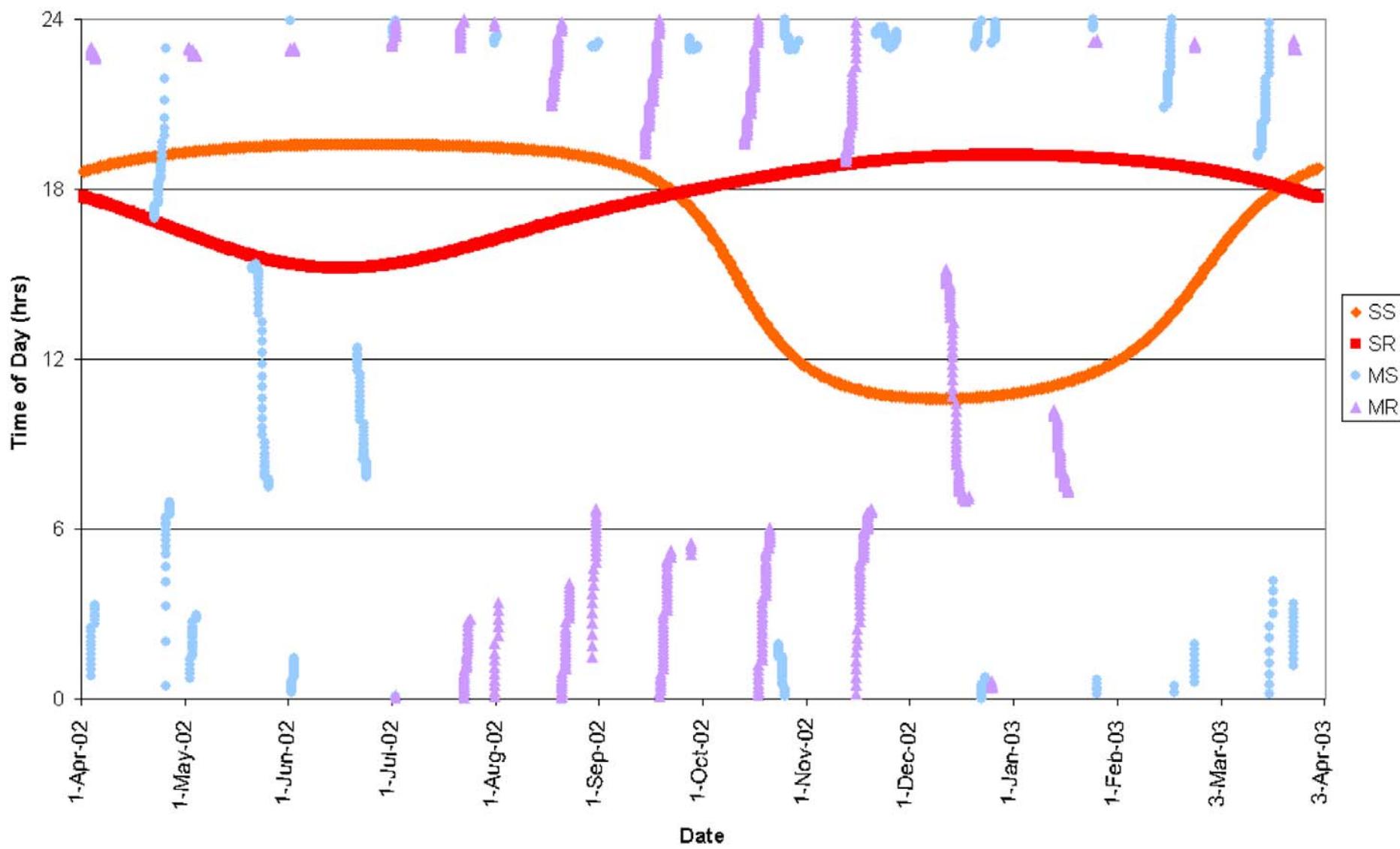
2003



Source file: sage3mb_PAL_20021030.txt

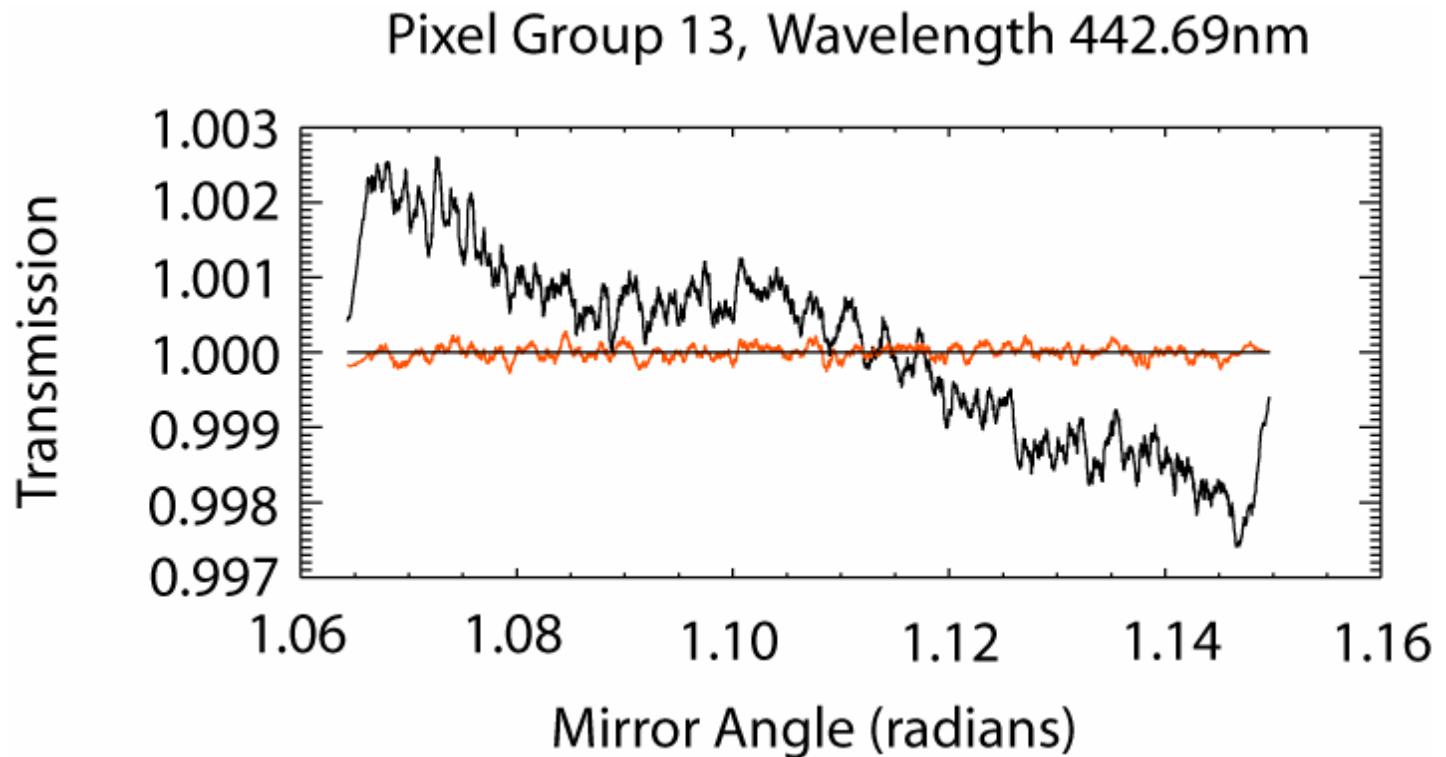
Predicted SAGE III Measurement Occurrence

Local Time of Events



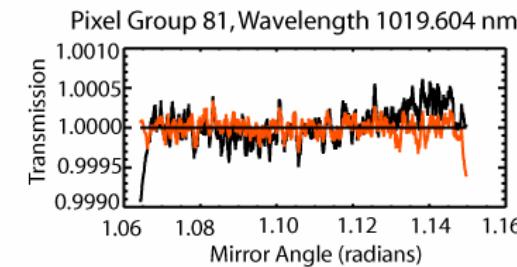
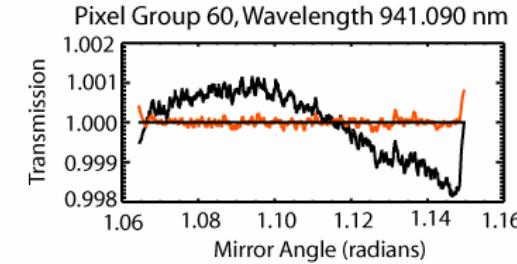
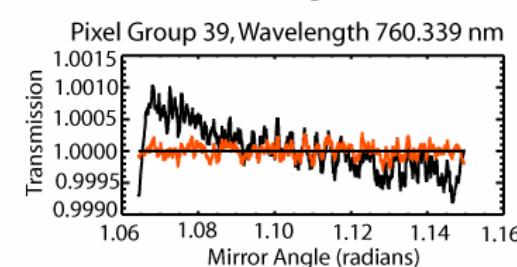
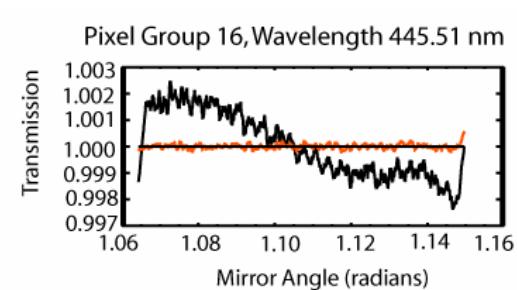
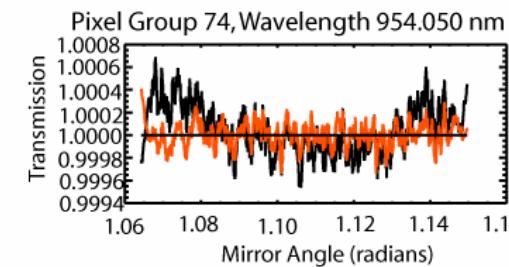
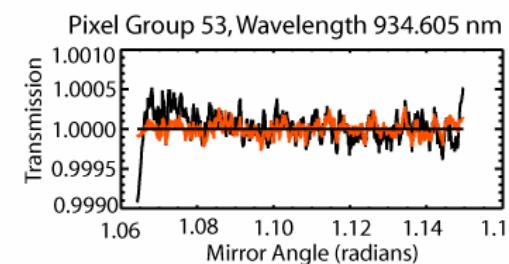
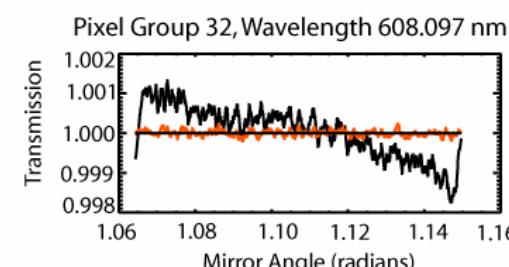
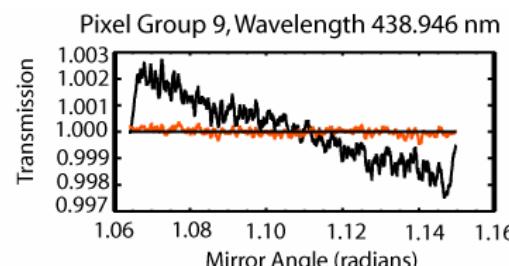
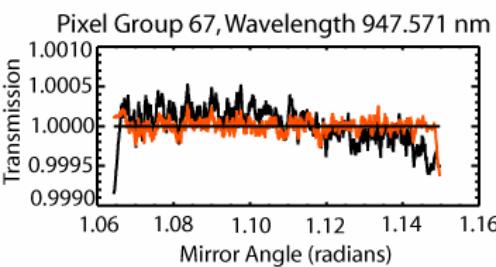
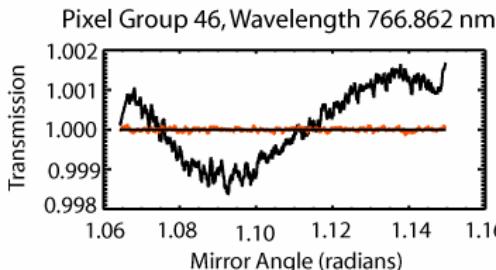
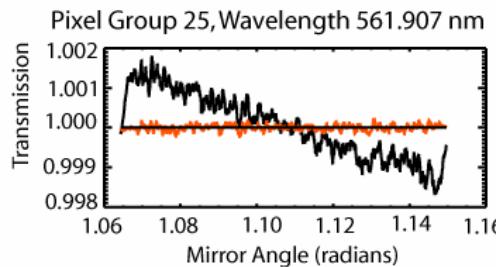
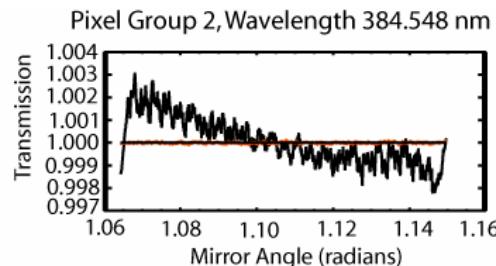


Attenuator Plate Correction



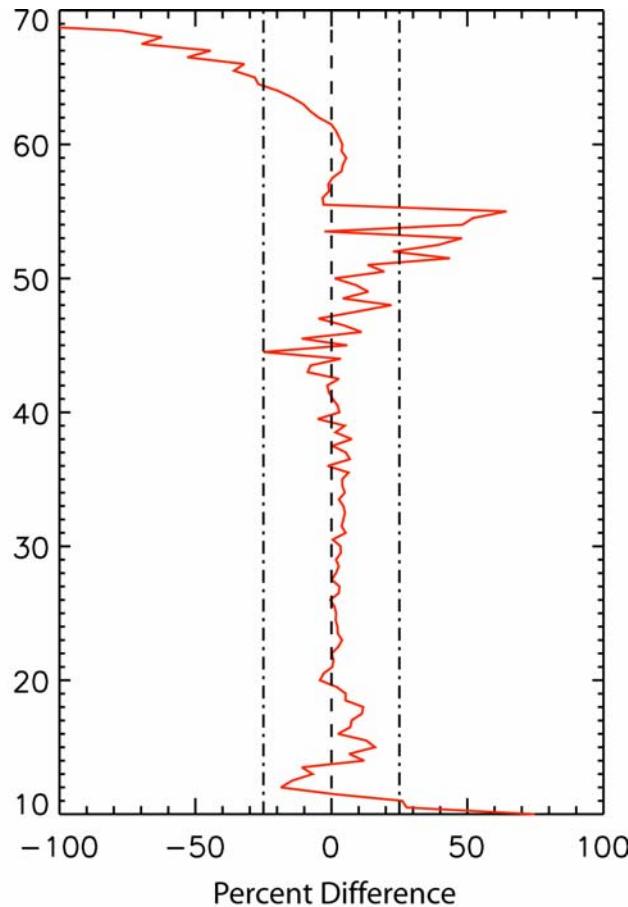
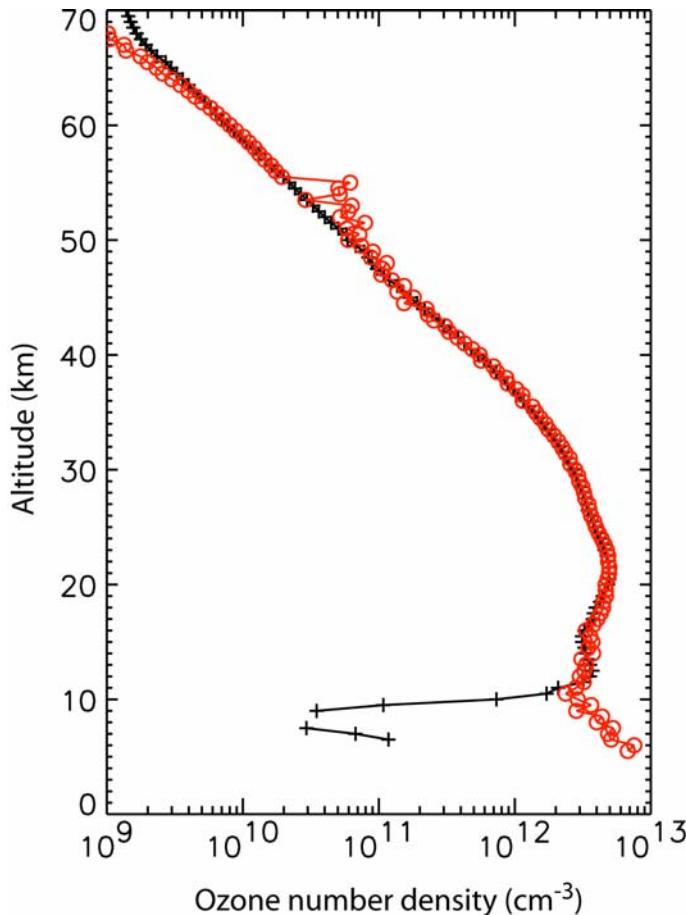


Attenuator Plate Correction





Ozone SAGE III vs. SAGE II

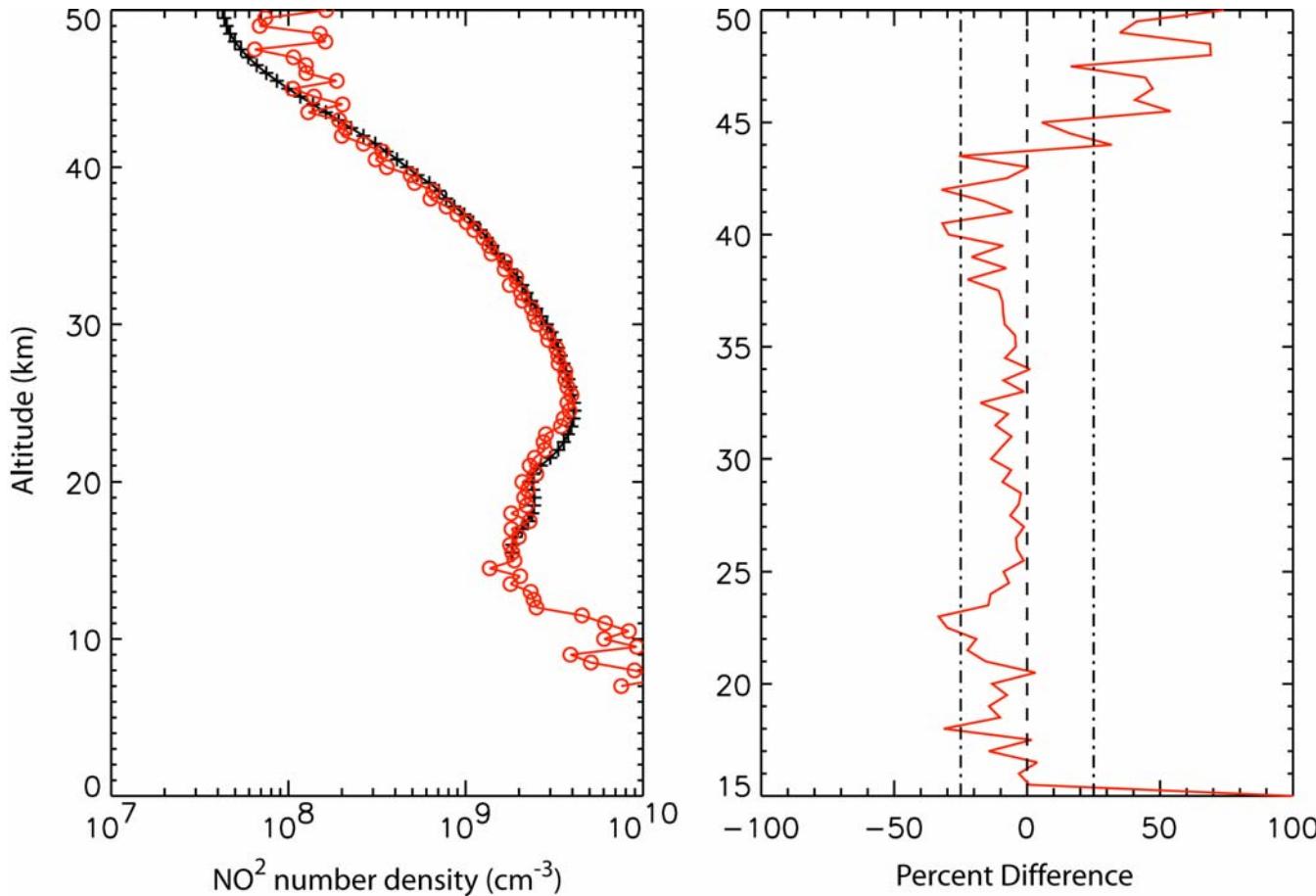


SAGE III (V1.06):
9-May-02 – 10-May-02
Lat: 50.04°N to 50.56°N
21 Profiles

SAGE II:
9-May-02
Lat: 52.11°N to 52.84°N
5 Profiles



NO₂ SAGE III vs. SAGE II



SAGE III (V1.06):

9-May-02
Lat: 50.04°N to 50.56°N
21 Profiles

SAGE II:

9-May-02
Lat: 52.11°N to 52.84°N
5 Profiles



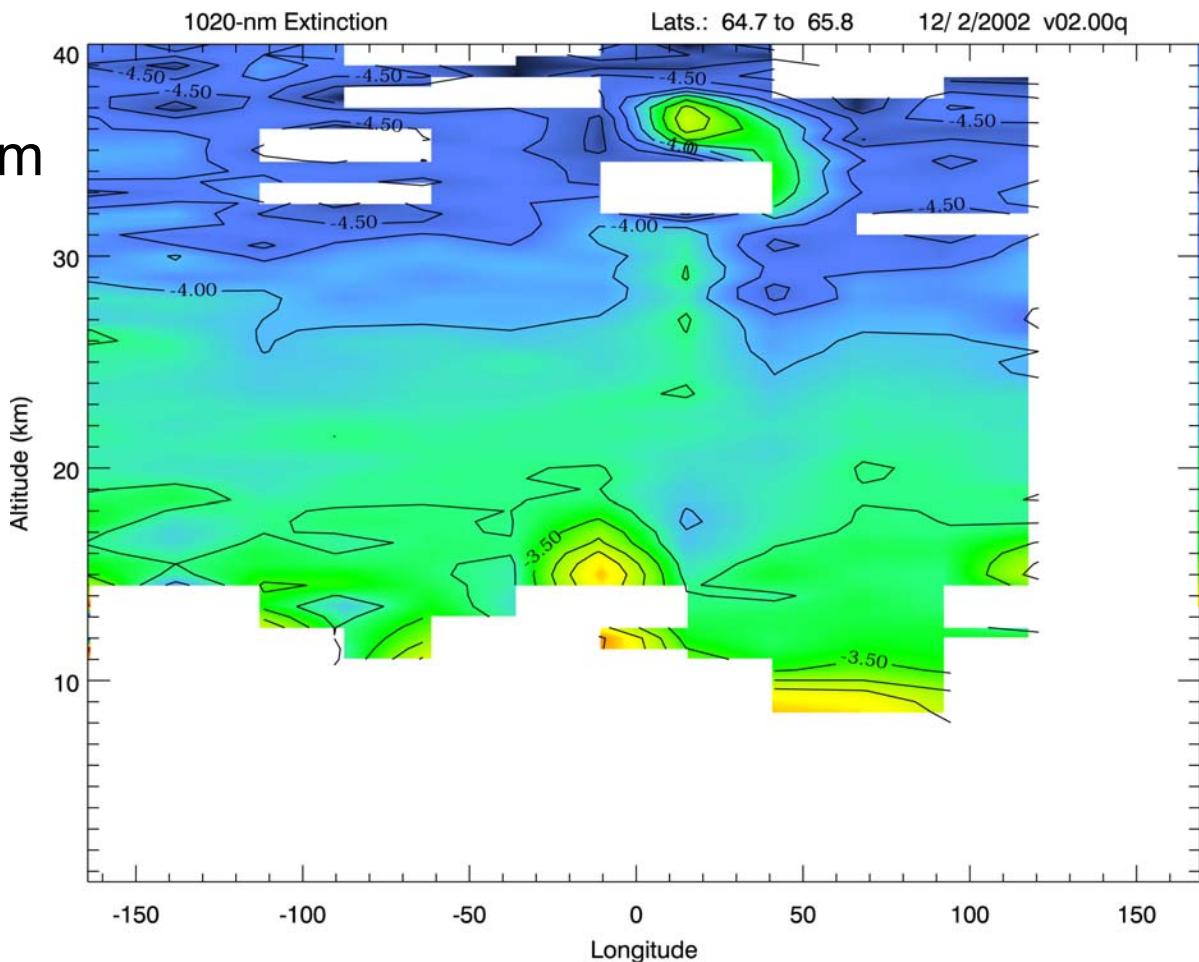
Quicklook Products

e.g., aerosol extinction 1020 nm



QL data available ~ 6 pm
day of observation in
Sweden

Complete Level 1 & 2
data set will be
transferred





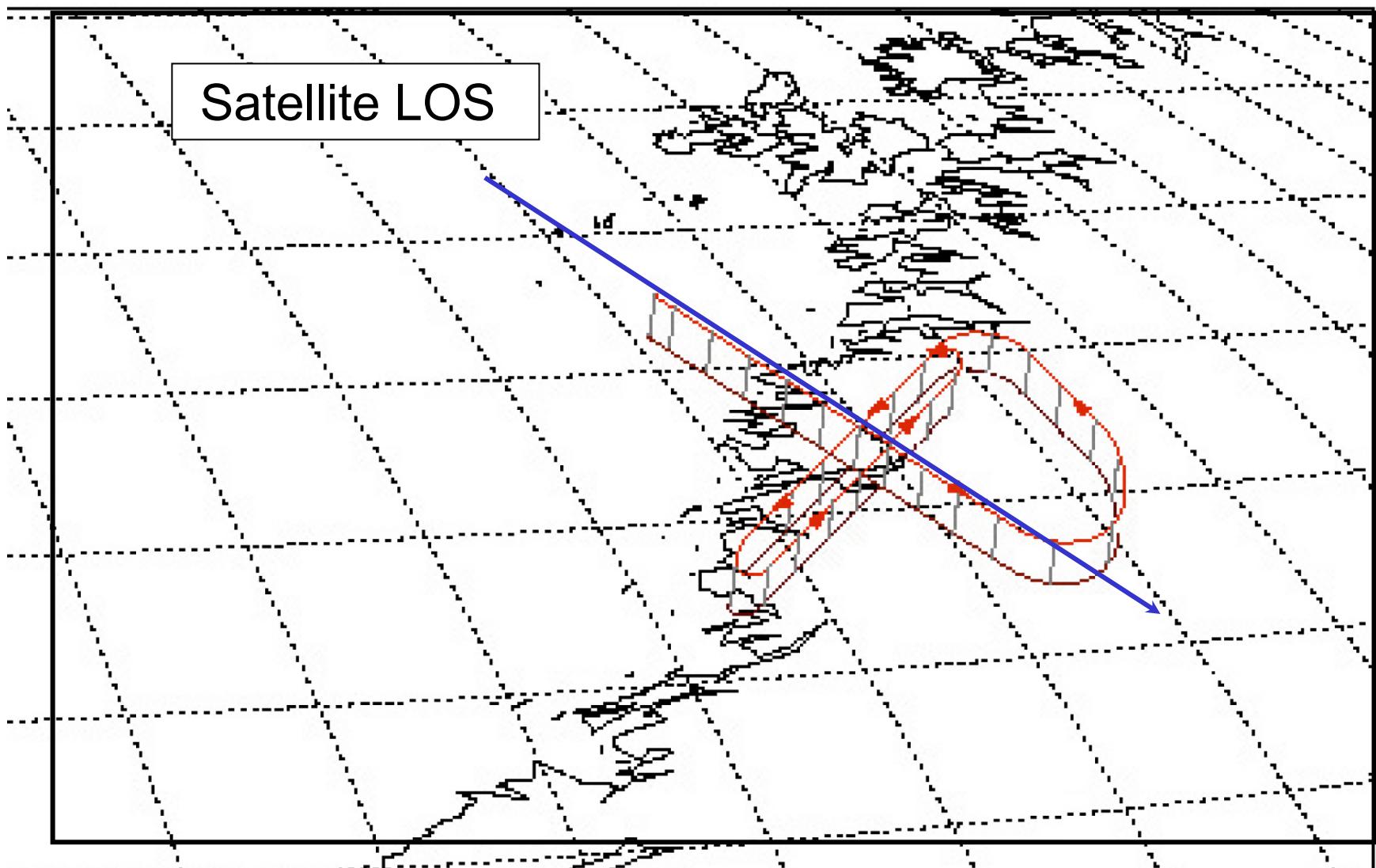
Measurement Strategy



- Correlative measurements
 - along LOS (curtain observations)
 - perpendicular to LOS (slant path optical depth obs)
 - profile descent at satellite tangent location (in situ obs)
- Comparisons with SAGE III spectral survey
 - SAGE event between 0° - 40° W from Jan 30 - Feb 4
- Best moonset observation opportunity
 - Jan 25 or 26 over southern Scandinavia
 - local midnight



'Strawman' Flight Strategy



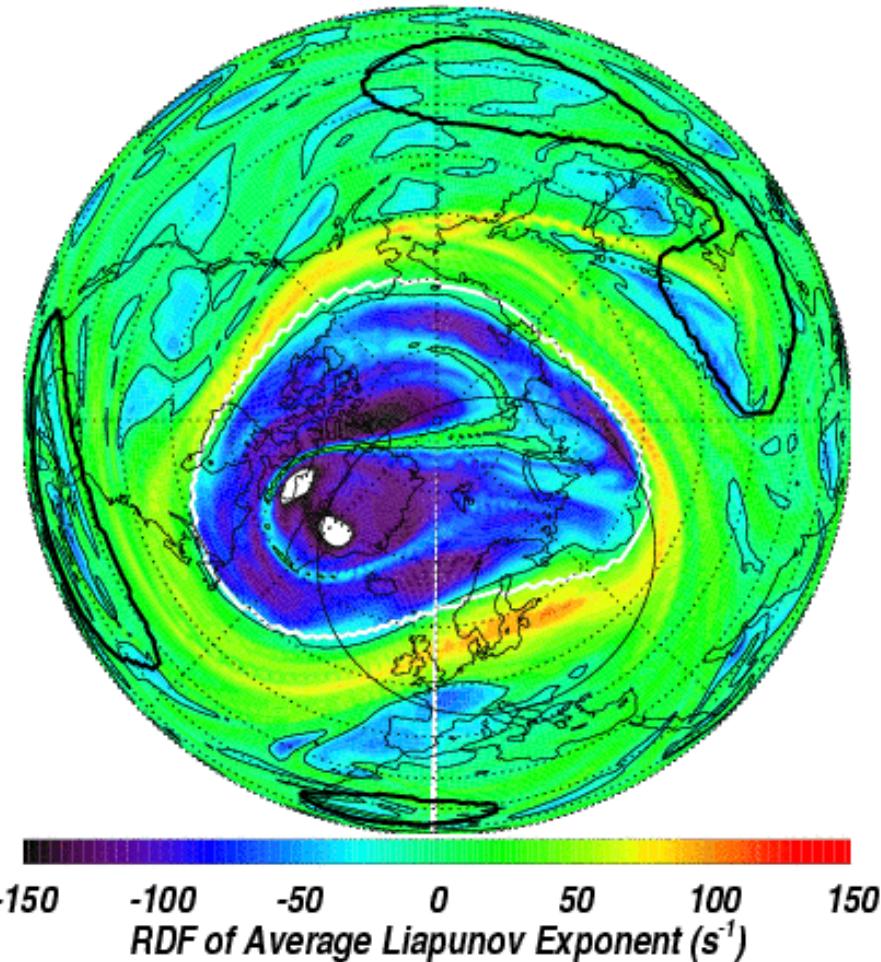


LaRC Forecast Support



20021212 (84 hr Forecast)

550K Mixing Efficiency





LaRC Forecast Support



Forecast trajectories along
SAGE, POAM LOS

Reverse Domain Filling
techniques

T, wind, PV, Mixing Efficiency,
etc.

URL catalogue

DAO driven (48 - 84 hr)

350, 450, 550, and 700 K

available by 6 am in Kiruna

